(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification⁷: G06F 3/147

(21) International Application Number: PCT/SE03/00336

(22) International Filing Date: 27 February 2003 (27.02.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/359,985   28 February 2002 (28.02.2002)   US

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(81) Designated States (national): AE, AG, AL, AM, AT (utility model), AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, ES, FI (utility model), FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK (utility model), SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SYSTEM AND METHOD FOR UPDATING ELECTRONIC LABEL DISPLAYS
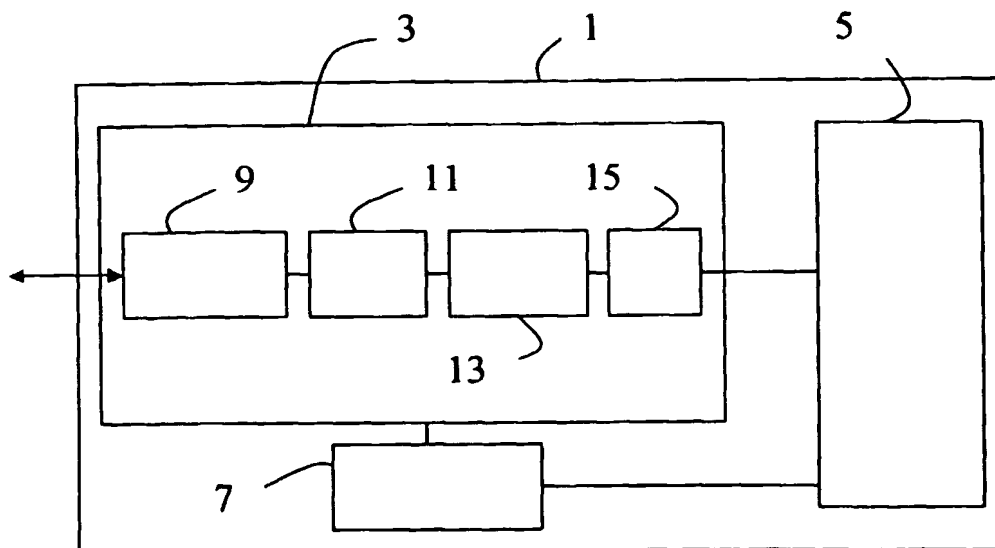
(57) Abstract: An electronic label, which is wirelessly connected to a product information updating system, said label comprising at least one display (3; 11,13,15) adapted to display product information.According to the invention the display (3; 11,13,15) has a transparent or semitransparent backside and is adapted to be lit up from behind.

SYSTEM AND METHOD FOR UPDATING ELECTRONIC LABEL DISPLAYS

TECHNICAL FIELD OF THE INVENTION

5   The present invention relates to an electronic label according to the preamble of claim 1.

It also relates to a server in an electronic product information updating system according to the preamble of claim 8.

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Furthermore it relates to a method for updating an electronic label according to the preamble of claim 11.

BACKGROUND OF THE INVENTION

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An electronic price label, a server and a method for updating the price label is described in for example EP 0228377.

In an electronic price updating system like this, price labels are attached to for

20   example the shelves in the store or nearby a product bin. The price labels comprise components for wireless communication with a price data base. Each time there is a price change for a product this is communicated out to the price label for this product and the price shown on the display in the price label is changed. Normally LCDs are used as displays.

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In US 2002/0020935 an electronic price label system is described where a dot matrix display is used in the price label. When a dot matrix display is used instead of a segment based display better resolution in the displayed image is achieved.

A problem with a wireless price label system using dot matrix displays is that the updating of the displays takes long time and a lot of power is required leading to a short lifetime. Price labels with low power consumptions are preferred.

5   SUMMARY

An object of the invention is to provide an electronic label with high resolution and low power consumption.

10   This object is achieved in an electronic label according to the preamble of claim 1, having the characterizing features of claim 1.

The object is also achieved by a server according to the preamble of claim 8, having the characterizing features of claim 8 and by a method according to the preamble of
15   claim 11 having the characterizing features of claim 11.

With this label, server and method a system is achieved where only parts of the display content is sent to the electronic label for updating. Hence the updating procedure takes less time than if the whole display image should be sent. Hereby the label need to be
20   turned on a less time thereby giving it a lower power consumption and longer battery life time. Preferably battery lifetime is very long in this kind of product and maybe also equal to the lifetime for the product itself.

Further advantageous embodiments of the invention are set out in the dependent
25   claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic view of an electronic label according to the invention.
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Fig. 2 is a schematic view of a server adapted to communicate wirelessly with labels according to the invention.

Fig. 3 is a flowchart of the process for updating labels according to the invention.

Fig. 4a and b show methods for deriving position information.

Fig. 5 shows a dot matrix display according to the invention where the information for several products is shown on the same label.

DETAILED DESCRIPTION OF EMBODIMENTS

The electronic label according to the invention is a label showing different information of a product. Often, but not necessarily always, the price of the product is included in this information. Therefore the label is called a price label hereafter in this description. However, other information than price could also be shown on the label and be updated from the updating system.

Fig. 1 is a schematic view of a price label 1 according to the invention. It comprises a microprocessor 3, a dot matrix display 5 connected to the microprocessor 3 and a power source 7 giving power to the microprocessor 3 and the display 5. The microprocessor 3 comprises a communication interface 9 which is adapted to communicate, preferably wirelessly with a server in the product information updating system. A wireless communication using for example IR or radio is preferred. The server is actually connected, wirelessly or via cable, to at least one transceiver that is adapted to receive and transmit data wirelessly to and from a plurality of price labels. The communication interface 9 is according to the invention adapted to receive updated information from the server and also positioning information about where in the dot matrix display this information should be shown. The updated information is usually a new price for the product related to this specific price label but it could also be other kinds of product information that should be updated.

There are different possibilities of how to indicate where in the dot matrix display the updated information should be shown. Fig. 4a and b show methods for deriving position information.

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Fig. 4a shows a method where a grid is defined on the display. The same grid, i.e. a grid with the same sizes and positions of the grid elements, is also known in the server and as described below the server comprises means for comparing the updated information with the displayed image and the grid and define which grid elements in

10   the grid that comprises updated information and thus need to be updated. Therefore, only the grid elements that need to be updated in the dot matrix display of the price label are communicated to the price label from the server. Furthermore position information about the position in the grid of these grid elements is communicated to the price label. In the example shown in Fig. 4a, 8 grid elements need to be sent if the

15   price 15.50 is to be updated to 26.95 for instance. Each part is individually identified by both the server and the display module. Hereby the server needs to store all the images displayed on the price labels connected to this server as will be further described below.

20   Another possibility, shown in Fig. 4b, is to define the position for the updated information in the server by comparing the updated information with the stored display image. Also the size of the updated part of the display image should be determined. This position information comprises position and size in the display image for the updated information and should be sent to the price label together with the updated

25   information.

In the example shown in Fig. 4b, 15.50 shall be updated to for example 16.95. Then the following area should be selected by the server. Reference point (horisontal dot number a, vertical dot number b) as marked by circle. Update area size (x dots height

30   and y dots width) as marked by a small square. The server sends at least the following

information to the display module [a,b,x,y,data] were data is the image content of square x*y.

With reference to Fig. 1 again, the microprocessor 3 further comprises a processing

5   means 11 connected to the communication interface 9. This processing means 11 is adapted to process the received information. The processing means 11 is adapted to process the position information and relate this to the image displayed on the dot matrix display. This image is also stored in a storing means 13 connected to the processing means 11. The processing means 11 is adapted to store the received

10   updated information in the correct position of the image in the storing means 13 according to the position information. Furthermore, in one embodiment of the invention, the processing means 11 is adapted to decompress the received updated information since in this embodiment the information was compressed in the server. Compression of the information would save sending and receiving capacities as well

15   as battery lifetime.

As to the generation of an image adapted to be shown on the dot matrix display this could either be performed in the server using a layout script as will be described below or in the price label itself. The updated information received in the server from a price

20   data base comprises only text, for example as ASCII code, and need to be transferred to an image. If the image generation is performed in the price label the processing means 11 performs this by using a layout script. An image is thus generated according to preset definitions in the layout script. These definitions typically relate to size and font of the text and to the positions in the display at which the various text parts should

25   be located. This layout script can be updated from the server. Hereby it is possible to change the layout of the display images, for example size and font of the text, from the server.

Furthermore the microprocessor 3 comprises a display updating means 15 connected

30   to the storing means 13 and to the dot matrix display 5. The display updating means is in one embodiment adapted to update the complete display 5 according to the content

in the storing means 13 each time a change of its content occurs. In another embodiment the display updating means 15 is adapted to update only the parts of the dot matrix display 5 that will be changed. However, in the latter case it is preferred that the complete display is updated regularly. The reason is that if the display is a

5   bistable display the image will slowly degenerate and it needs to be updated regularly. A bistable display is preferred since in such a display power is only needed during the updating of the display. This will save battery lifetime.

If only the part of the display that will be changed should be updated, i.e. the second

10   variant mentioned above. The processing means 11 could be connected directly to the display updating means 15 and the display is simply updated each time updated information has been received. In a further embodiment of the invention the storing means comprises more than one display image. Different display images are stored giving the possibility to change image on the display. The price label could be

15   provided with a button or the like for the user to press for changing the display image. The store staff could for example need to see some other information about the product, such as storage status or other product related information.

Fig. 2 is a schematic view of a server 21 adapted to communicate wirelessly, for

20   example via IR or radio, with price labels according to the invention. The server is connected to for example a cash register and data bases comprising information that can be updated in the price labels. Normally the server is placed in a computer that also could comprise for example the cash register in a store. Price changes and other updated information is received in a receiving means 23 in the server 21 from for

25   example a price data base. The server comprises also a processing means 25 adapted to process the received information. If the image should be generated in the server 21 and not in the price label 1 the processing means 25 is adapted to generate an image adapted to be shown on the dot matrix display of the price label related to this product, i.e. the price label (or labels) showing the information of the product for which

30   updated information was received. The received updated information is for example

received as coded text, for example ASCII coded. For generating an image from this text a layout script is used as described above.

Furthermore the processing means 25 is adapted to compare the received updated

5   information with a stored image that is identical to the image shown on the price label showing the information that should be changed. Thus a storing means 27 is provided in the server 1. This storing means 27 is connected to the processing means and comprises all the images shown on the price labels connected to this server 21. An alternative to storing all the display images is that the server easily can regenerate the

10   image from parameters stored in the server using the layout script. The processing means 25 compares the received updated information with the stored image for this product and relates the updated information to a position according to one of the possibilities described above, i.e. a predefined grid or just a position definition together with a size. The processing means 25 forwards the generated image, or the

15   received updated information if the image generation is performed in the price label instead, together with the position information to the communication interface 29.

The processing means 25 comprises also a register of which price labels that are related to which products. Thus the processing means 25 can choose the right image

20   from the storing means 27 for the comparison. The updated information together with position information is also given the right address when sending it to the price label. Thus the processing means 25 is also adapted to give the information an address to be sent to. In one embodiment of the invention the processing means 25 is also adapted to compress the information before sending it. This could be performed by using a

25   suitable method for compression.

The communication interface 29 is adapted to send the updated information together with the position information to the price label having the address given by the processing means 25.

30

The processing means 25 in the server is further adapted to store the new, updated image in the storing means 27 such that the images in the storing means 27 always are updated and correspond to the images shown on the price labels.

5   In one embodiment of the invention the image displayed on the dot matrix display is divided into two parts, a background image part and a front image part. The background image part comprises all the information that probably does not need to be updated often, such as for example the product description, picture and logo. The background image part is thus more or less static and it is stored in the storing means

10   13 in the price label. The front image part comprises the information that will be updated regularly, such as for example the price. In this embodiment the server only sends the front image part with updated information to the price label. The processing means 11 in the price label 1 processes the received information and the display updating means 15 combines this new front image part to the old background image

15   part according to preset definitions. One possibility is that the display is separated into two parts where one part is dedicated for the background image part and the other part is dedicated for the front image part. In this case the old front image part is replaced by the new front image part. Otherwise the two image parts are merged together according to preset definitions. Sometimes the background part maybe also need to be

20   updated. This is performed in the same way as other information is updated according to this invention.

According to what has already been described above the front image part could either be generated as a dot matrix image in the server or it could be sent as coded text, for

25   example ASCII code, to the price label where the generation of the image in this case is performed in the processing means 11.

According to one embodiment of the invention it is also possible to show color images on the dot matrix display. To send a color image and to process it in the price label

30   requires much more resources than sending and processing a monochrome image. One possibility to be able to use color images without the need of an excess amount of

resources is to use a cholosteric LCD as display. In this type of display it is common to stack two LCDs of different colors over each other. This gives a display where each pixel can have one of four different colors. The colors are dependent on the colors of the two LCDs but if one LCD is green and the other is red a pixel where only the red

5   display is "turned on" is red, a pixel where only the green display is "turned on" is green, a pixel where both the displays are turned on is black and a pixel where none of the displays are turned on is white. This type of display requires only two bits per pixel for color information.

10   Another possibility to show color images on the price label without the need of too much resources is to use a color template in the price label. This color template comprises information of which color that should be used in which part of the image shown on the dot matrix display. In most cases it would not be necessary to change colors for the different parts of the display and then this technique with a color

15   template is a good alternative to a full color image. Hereby a monochrome image or monochrome information is sent from the server to the price label and the monochrome image is combined with the color template when the display is updated. Thus the dot matrix image shown on the display can have different colors. The color template could also be updated in the same way as other information is updated

20   according to this invention, i.e. updated information together with position information is sent from the server to the price label. For example the color could be changed to red, when a sale price is displayed. This coloring method can be used for 2 colors (requiring a 1 bit color template), 4 colors (requiring a 2 bit color template) et cetera. Furthermore a means for converting the color information into a format used in the

25   display is needed. For example, if the display is a display with 4 bit per pixel and the color template is a 2 bit color template, a translation from 2 bit color to 4 bit color is needed is needed in the price label. However, in this case it might be better to use a 4 bit color template and thus eliminate the need of translation processing in the price label. All processing in the price label consumes power, translation as well as

30   communication, so it is a tradeoff between communication speed and power

consumption as well as how many bits color the LCD takes that sets the optimal color template to use.

Each price label must have an address for identification. Furthermore each price label

5   need to be linked to the product it is related to. Today it is common to provide each price label with a sticker comprising the bar-code of the product and a bar-code identifying the address of the price label.

To be able to use a dot matrix sign in a retail environment the product intended to be

10   displayed on the sign must be connected to the sign. This procedure is known as linking the product to the sign.

The dot matrix price label contains a dot matrix price label identification, a description of the product displayed on the display, and identification of this product.

15

Price label identification can be a printed bar-code, preferably attached on the backside of the product. Alternatively it can be a memory in the label that is accessible with a hand held device using wireless communication like RFID, IR, Radio et cetera. It could also be presented as a bar-code or in another way at the display enabling a bar

20   code scanner or similar to scan it.

The product description can be a printed paper overlay that is attached to the label. For a common segment based display showing only the price this paper overlay is needed for the customers to know what item the price is shown for. When linking off the

25   product this label must also be removed and a new one be attached for the new item to be displayed. However, using a dot matrix display, as in this invention, the use of a paper overlay can be avoided. All functions connected to the paper label overlay can now be handled using the memory and the display. The product description is as described above shown on the label display.

30

Product identification can be a printed bar-code, often on the same sticker as the product description if such a sticker is used. Alternatively it can be a memory in the label that is accessible with a hand held device using wireless communication like RFID, IR, Radio et cetera. It could also be presented as a bar-code or in another way at the display enabling a bar code scanner or similar to scan it.

A dot matrix price label is also possible to use as a menu sign. This means that several items (products) are shown on the same label (sign). This price label requires new functions regarding the linking process. The obvious is that it has to be possible to relate (link) one sign to several items. In more detail the system creating the picture to be shown on the display must have functions for arranging the information of the items as wanted. See for example in figure 5, where a menu sign according to the invention is shown. In figure 5a four items are linked to the menu sign and shown on the display, i.e. their names and their prices are shown. In figure 5b the second of these items has been removed from the list, i.e. been linked off from these menu sign. Therefore a row in the middle of the sign is empty. In figure 5c the two items under the empty row are automatically moved up one row each to fill empty row. In more general terms, several items are listed with their prices. If an item, which has a place in the middle of the list, is linked off, i.e. should not be related to this label (sign) anymore, the items after this item in the list should all be moved up one row in order not to have empty rows in the item list. Consequently it should be possible to position a newly linked item in the middle of the item list and items after the new item should then be moved down one row. Preferably the system comprises a method for checking that not too many items are linked to the menu sign. When the display is full, for example when all the rows in the list shown in figure 5 are occupied, an error message should be sent to the user trying to link another item to this menu sign. The server shall preferably have a memory containing information about all the images currently shown on the menu signs in order for the store personal to see all menu signs when linking on items to a menu sign or linking off items from the menu sign.

Bar-codes are usually one-dimensional (1D) consisting of thick or thin lines, preferably black, separated by thick or thin fields of background, preferably white. There also exist two-dimensional (2D) bar-codes that can be described as several one dimensional bar-codes stacked on each other, these bar-code can retain a lot more

5   information than the one-dimensional bar-codes.

Thus, in a price label comprising a dot matrix display according to the invention it is possible to provide the bar-codes in the display image instead for bar-codes on stickers. Hereby the bar-codes do not have to be changed manually. Instead everything

10   can be managed from the server. For example when a price label is moved and should show the price for another product the new bar-code is provided from the server to the price label as updated information according to what has been described above.

Furthermore it is possible to use RFID (Radio Frequency Identification) recorded by

15   radio as identification means instead of bar-codes. It would also be possible to read the identification of the price label and the related product through a wireless communication interface, for example IR or radio. This requires that the communication interface and the processing means in the label have functionality to receive requests for transmitting label ID and functionality to transmit the label ID to

20   the device that requested it. (The device here is suitably a hand held unit used most often by the store personal).

Fig. 3 is a flowchart of the process for updating price labels according to the invention. The different steps of the method are described in order below:

25

S31: Storing in a server all different display images present in the price labels communicating with this server.

S33: Receiving in the server updated information for a product from for example a

30   price data base connected to the server. The updated information is for example a new price for a product.

S35: Comparing in the server the updated information with the display image for this
product. A register where it is shown which product each price label is related to is
present in the server. Thus the server can find the correct image to be compared with

5   the updated information. This comparison will show where in the image the updated
information should be placed.

S36: Providing the updated information with a position information. In one
embodiment the price label display is divided into a grid. The server has also

10   knowledge about this grid and from the comparison the server can derive which ones
of the squares in the grid that should be updated. Thereafter only the squares that
should be updated are communicated to the price label together with a position
information of which grid squares in the image that should be replaced. In another
embodiment the server compares the updated information with the display image and

15   derives a position and a size of the information that should be replaced. This position
information is communicated together with the updated information to the price label
as discussed above.

S37: Processing the updated information according to preset definitions. The

20   processing could include to generate an image from the received updated information
by using a layout script as described above. In one embodiment the information is also
compressed before it is sent to the price label. Furthermore the information is given the
right address.

25   S39: Sending the processed updated information together with the position information
to the price label (or labels) that is showing the price for this product.

S41: receiving the updated information and the position information in the price label.

S43: possibly decompressing the information if it was compressed in the server and then processing the position information and possibly also generating an image from a coded text as described above.

5   S45: storing the updated information in the storing means in the price label according to the position information.

S47: updating the display. Preferably the whole display is updated if a bistable display is used as discussed above.

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CLAIMS

1. An electronic label, which is wirelessly connected to a product information updating
5   system, said label comprising a wireless communication interface (9) adapted to
     receive information to be shown on a display (5), a processing means (11) connected
     to the communication interface (9), a display updating means (15) connected to the
     processing means (11) and at least one dot matrix display (5) connected to the display
     updating means (15) and adapted to display an image of product information,
10   **characterised in that** the communication interface (9) is adapted to receive from the
     updating system only the part of the image that has been changed together with
     information about where in the display image this updated information should be
     placed and **in that** the display updating means (15) is adapted to update the display (5)
     accordingly.
15

     2. An electronic label according to claim 1, **characterised in that** it comprises storing
     means (13) connected to the processing means (11) and to the display updating means
     (15), the storing means (13) being adapted to store the image shown on the display (5)
     and the processing means (11) being adapted to store the received updated information
20   at the proper positions in the display image in the storing means (13) according to the
     received position information.

     3. An electronic label according to claim 1 or 2, **characterised in that** the display
     updating means (15) is adapted to update the complete display image each time
25   updated information has been received in the label.

     4. An electronic label according to claim 1 or 2, **characterised in that** the display
     updating means (15) is adapted to update only the parts to be changed in the display
     image each time updated information has been received in the label.
30

5. An electronic label according to any one of the claims 1-4, **characterised in that** the communication interface (9) is adapted to receive a front image part as updated information from the updating system, said front image part comprising information often updated, the label processing means (11) being adapted to process this front

5   image part and combine it with a background image part comprising information that is changed more seldom.

6. An electronic label according to any one of the preceding claims, **characterised in that** the label processing means (11) is adapted to generate a dot matrix image from

10   the received updated information using a layout script.

7. An electronic label according to any one of the preceding claims, **characterised in that** the processing means (11) comprises a colour template giving the different parts of the displayed image different colours.

15

8. A server in an electronic product information updating system, the system comprising at least one electronic label which is wirelessly connected to the server and adapted to be updated from the server, said server comprising receiving means (23) adapted to receive updated product information from at least one connected data base,

20   server processing means (25) connected to the receiving means (23) and adapted to process the received updated product information and a communication interface (29) connected to the processing means (25) and adapted to transmit the updated product information to the label(s) related to this product, **characterised in that** the server further comprises a storing means (27) connected to the processing means (25) and

25   adapted to store display images, which are shown on the labels and in that the processing means (25) is adapted to compare the received updated product information with the corresponding stored image and derive a position in the image for the updated information and in that the communication interface (29) is adapted to send this position information together with the updated product information to the price

30   label(s) related to this product.

9. A server according to claim 8, **characterised in that** the processing means (25) is

adapted to process the received updated information in order to fit it into a front image

part, said front image part comprising parts of the information in the label that are

regularly updated and in that the communication interface (29) is adapted to send the

5   updated front image part to the price label(s) related to this product where the front

image part is adapted to be combined with a background image part, which comprises

information that is more seldom changed, the two parts combined together constituting

the display image in the label.

10   10. A server according to claim 8 or 9, **characterised in that** the processing means

(25) is adapted to process the received updated information and generate a dot matrix

image using a layout script.

11. A method for updating at least one electronic label (1) having a dot matrix display

15   (5) comprising the steps of:

- receiving updated information related to a product in a server (21), which is

wirelessly connected to the label(s) (1);

- comparing the updated information with a display image shown on the label(s) (1),

which is related to this product, said image being stored or can be regenerated in the

20   server (21);

- deriving from said comparison the position of the updated information in the display

image;

- forwarding the updated information together with position information about where

in the display image the updated information should be located to the price label(s) (1)

25   related to this product;

- updating the dot matrix display (5) according to the received updated information

and position information.

12. A method according to claim 11, comprising storing the updated information in a

30   position in a storing means (13) in the label (1) where the display image is stored, said

position corresponding to the position information and thereafter updating the display.

13. A method according to claim 12, where the step of updating comprises updating the complete display image.

5   14. A method according to claim 11 or 12, where the step of updating comprises updating only the changed information.

15. A method according to any one of the claims 11-14, comprising processing the received updated information and generating a dot matrix image by using a layout

10   script in the label (1).

16. A method according to any one of the claims 11-15, comprising compressing the updated information in the server (21) and decompressing the updated information in the label (1).

15

17. A method according to any one of the claims 11-16, comprising providing a colour template in the label (1) giving different colours to different parts of the displayed image though only monochromatic information is sent from the server.

20   18. A method according to any one of the claims 11-17, comprising dividing the display image into two parts, one background image part comprising seldom changed information and one front image part comprising information being more regularly updated, storing the background image part in the label and sending updated front image parts from the server (21) to the price label(s), combining the background and

25   front image parts in the label (1) and displaying the combination in the dot matrix display (5).

19. A method according to any one of the claim 11-18, comprising identifying the label by accessing, with a device using wireless communication, a memory in the label

30   comprising a label identification.

20. A method according to any one of the claims 11-19, comprising identifying the product linked to the label by accessing, with a device using wireless communication, a memory in the label comprising a product identification.

5   21. A method according to any one of the claims 11-20, comprising identifying the label by using a bar-code scanner for scanning a label identification bar-code displayed on the label display.

22. A method according to any one of the claims 11-19, comprising identifying the

10   product linked to the label by using a bar-code scanner for scanning a product identification bar-code displayed on the label display.

23. A method according to any one of the claims 11-22, comprising relating several products to the same electronic label.

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24. A method according to claim 23, comprising arranging the information about the several products in a list in the image and rearranging the information when a product is removed or added.

Fig. 1

Fig. 2

Storing   — S31

Receiving updated
information   — S33

Comparing   — S35

Providing with
position information   S36

Processing   — S37

Sending   — S39

Receiving   — S41

Processing   — S43

Storing   — S45

Updating display   — S47
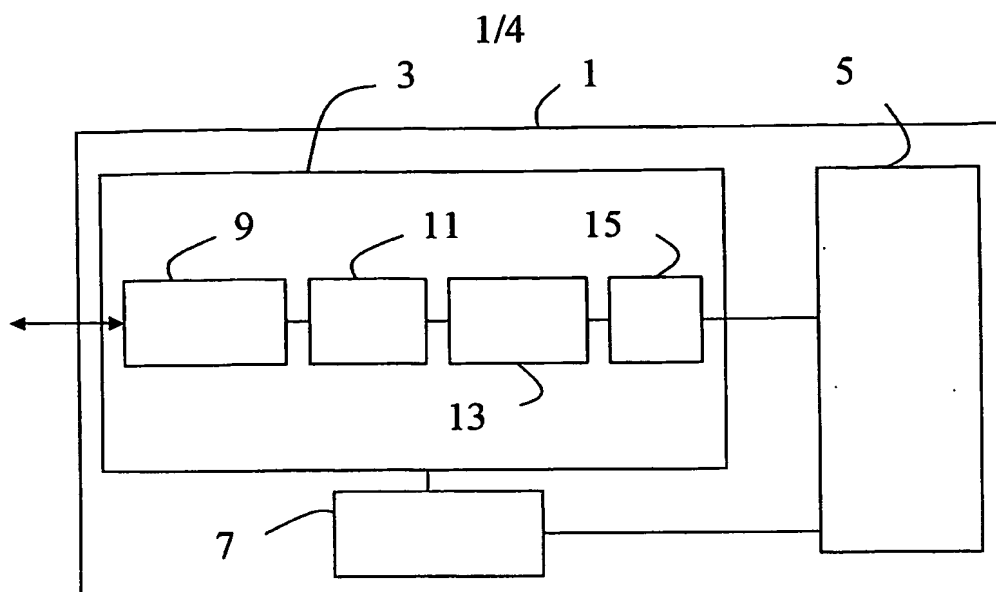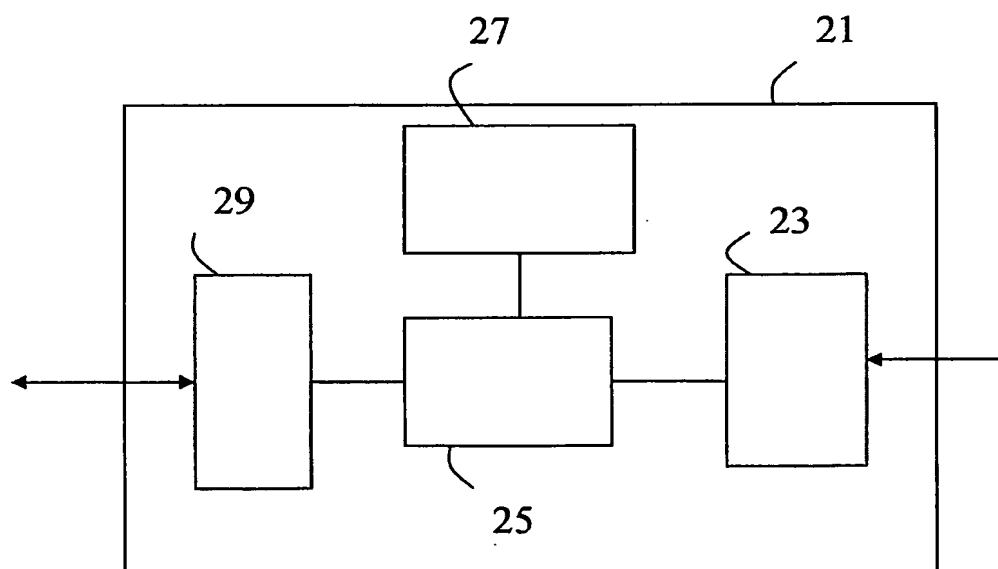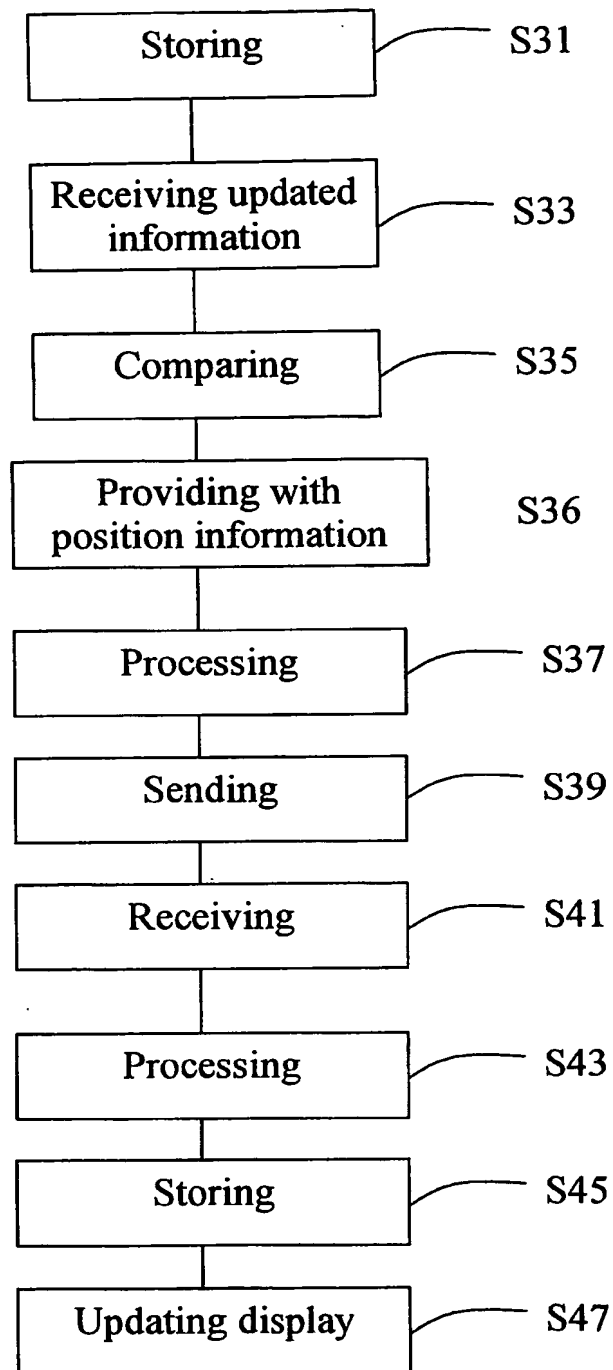
Fig. 3
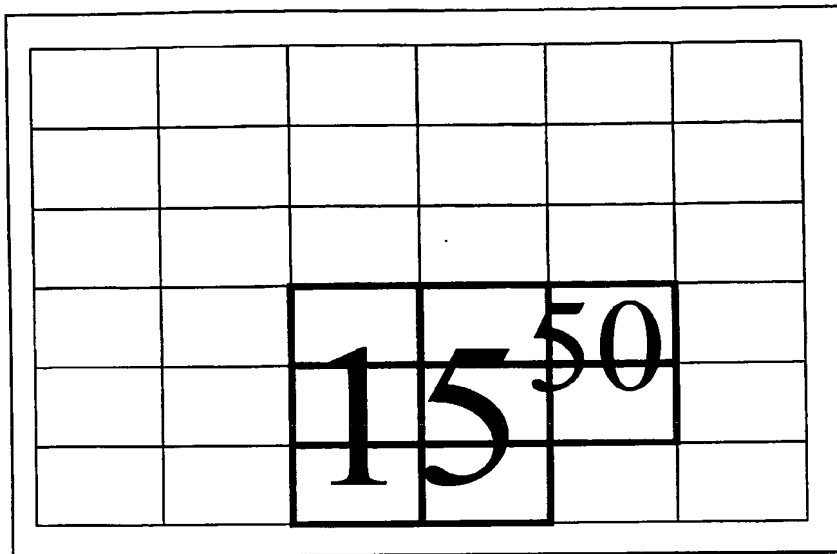
Fig. 4a
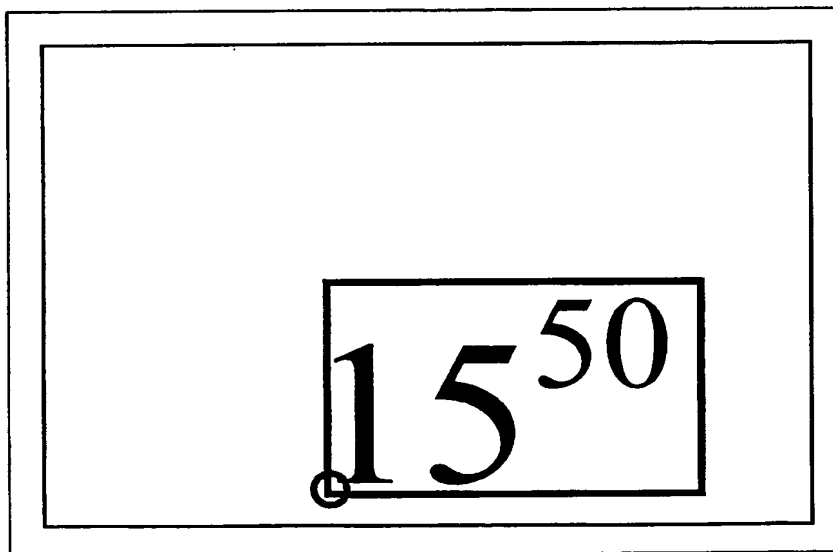
Fig. 4b

Item 1	price 1
Item 2	price 2
Item 3	price 3
Item 4	price 4

Fig. 5a

Item 1	price 1
Item 3	price 3
Item 4	price 4

Fig. 5b

Item 1	price 1
Item 3	price 3
Item 4	price 4

Fig. 5c

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G06F 3/147

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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[X] Further documents are listed in the continuation of Box C.   [X] See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 May 2003	1 6 -05- 2003
Name and mailing address of the ISA/	Authorized officer
Swedish Patent Office Box 5055, S-102 42 STOCKHOLM	
Facsimile No. +46 8 666 02 86	Nina Ödling /LR Telephone No. +46 8 782 25 00

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